

REMARKS

Claims 1 and 4 are now pending in the application. Claims 6 and 8 have been canceled. Claims 1 and 4 stand rejected. Claims 10-16 were withdrawn from consideration and have been cancelled. Claims 1 and 4 have been amended for clarity. Support for the amendments may be found in Paragraphs [0011], [0013], [0028], and [0045].

Applicants believe that it is proper to enter this amendment because the claim amendment clarifies that the root-mean-square value is what is determined. Previously, the root-mean-square value had been characterized in the claim as a representative statistical value, which was also characterized as a differential pressure fluctuation parameter. While these characterizations were correct, they were superfluous and a confusing artifact from prior claim amendments. Applicants believe this clarification raises no new issues, as the claim element remains “executable logic for determining a root-mean-square value” and the excised words, while correctly descriptive of what the root-mean-square value is (see cited paragraphs from the specification), did not further modify this element in any way.

Applicants further believe that this amendment resolves the enablement issue.

REJECTION UNDER 35 U.S.C. § 112

Claims 1 and 4 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. This rejection is respectfully traversed.

The executable logic of Applicants’ controller determines a root-mean-square value from a set of data of differential pressure signals generated by the transducer and

controls the vaporized water source in response the root-mean-square value. In claim 4, the controller compares the root-mean-square value to a threshold value.

Applicants respectfully assert that such controller logic is straightforward; there is nothing in making and using the claimed fuel stack that is not amply enabled by the present specification in view of well-known fundamentals of on-board computers and controllers and the basic, ubiquitous mathematical technique of calculating root-mean-squares from a set of value. A specification is enabling if it allows a person skilled in the art to make and use the invention without undue experimentation. *In re Wands*, 8 U.S.P.Q.2d (BNA) 1400 (Fed. Cir. 1988). "A patent need not disclose what is well known in the art." *Id.* at 1402.

One of ordinary skill in the fuel cell art would know how to implement a computer having controller logic as claimed by Applicants. As previously stated, the Fuel Cell Technology Handbook states that on-board computers and controllers are "industry standard" and thus are known to one of skill in the art. *Fuel Cell Technology Handbook*, Gregor Hoogers, ed. at 10-24 (2003). Applicants have used a novel application of those "industry standard" computers and controllers for purposes of controlling water in the cell, but the logic entailed in doing so is just not that complicated.

Applicants respectfully assert that they have provided "all information necessary to perform the function, except for basic mathematical techniques that would be known to any person skilled in the pertinent art." *Aristocrat Tech. Australia PTY Ltd. V. Int'l Game Tech.*, 86 USPQ2d 1235, 1242 (Fed. Cir. 2008). Applicants' fuel cell includes a computer including a controller which controls the fuel cell using logic based on pressure fluctuations calculated using a root-mean-square value. The "basic

mathematical technique” of calculating a root-mean-square is a simple statistical calculation well-known to one of skill in the art. See, *Electronics Engineers’ Handbook*, 3rd Edition, Donald G. Fink, et al. at 3-20 (1989). The computer collects, executes a root-mean-square calculation, and responds to the calculated RMS value. The computer is distinguishable, and therefore Applicants’ claimed apparatus is different.

Accordingly, Applicants have enabled the computer and executable logic for one of ordinary skill in the art. Reconsideration of the claims and removal of the §112 rejection are respectfully requested.

transducer repeatedly measuring a differential pressure across said flow field

REJECTION UNDER 35 U.S.C. §§ 102/103

Claims 1 and 4 stand rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as being unpatentable over DiPierno Bosco et al. (U.S. Patent No. 6,103,409) This rejection is respectfully traversed.

The DiPierno Bosco et al. approach is distinguishable from the present invention in that it requires that one measure all anode and cathode pressure drops at every combination of flow and electrical load condition expected to be encountered during fuel cell operation in order to establish the predetermined thresholds of unacceptability. See the first box in Fig. 2 and top of column 5. In contrast to the present invention, the DiPierno Bosco et al. system controller does not include executable logic for determining a root-mean-square of the differential pressure signals as a value that determines control applied to the vaporized water source as claimed by Applicants. thus, there can be no anticipation.

The Office Action points to no reason from the DiPierro Bosco disclosure, or elsewhere in the prior art, to modify the DiPierro Bosco fuel cell with Applicants' control of fuel cell humidification. The root-mean-square is different from the DiPierro Bosco et al. comparison to pressure drop in an unflooded reference stack. Applicants' parameter is based on the statistical value, root-mean-square, determined from the executable logic. The claimed fuel cell stack is thus patentable over the DiPierro Bosco patent disclosure.

Moreover, Applicants' invention offers unexpected benefits compared to the prior art DiPierro Bosco system. Applicants' claimed invention can control humidification with no prior knowledge of unflooded stack pressure drops at because Applicants' detection method considers only fluctuations about the mean pressure drop reading. Applicants' claimed invention provides sensitivity and speed of measurement which is not disclosed, taught by, or inherent in the DiPierro Bosco et al. system which is limited to measurements based on the reference fuel cell.

Applicants' unexpectedly improved speed and sensitivity is illustrated in that the pressure drop indication based on the differential fluctuations provides a reasonable steady-state condition after an elapsed time of only 100 seconds. Additionally, for example, Applicants' invention facilitates sampling at 10 Hz or greater which is much more amenable to automotive fuel cell operation where the dynamic load following operation rarely allows for greater than several minutes at a fixed load condition. Paragraph [0044]. Further, Applicants' system achieves a relatively steady state after 100 seconds. Figures 4 and 6. In comparison, the DiPierro Bosco et al. pressure drop indication attains a reasonable steady-state condition after an elapsed time of 1000

seconds. Figure 4 of DiPierno Bosco et al. In this example, Applicants' claimed invention provides a 10-fold increase in speed and in sensitivity. Applicants assert that, even if a prima facie case of obviousness had been made, the unexpected results provide a secondary consideration evidencing patentability which Applicants assert weigh in favor of patentability and non-obviousness. See *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966); *In re Sullivan*, 84 USPQ2d 1034 (Fed. Cir. 2007).

Additionally, Applicants' claimed fuel cell provides "an accurate determination of the onset of flooding status and control", "optimization of stoichiometry with a comparable optimization of air compressor capacity, efficient management of rapid power transits, and data for effective management of stack purge." Paragraph [0054].


As DiPierno Bosco et al. do not disclose, teach, or provide a reason to make Applicants' claimed fuel cell system, reconsideration of the claims and removal of these rejections are respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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